



**US Army Corps
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Construction Engineering
Research Laboratory

Fact Sheet

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CONSTRUCTED WETLAND TECHNOLOGY TO TREAT DOD INSTALLATION DOMESTIC WASTEWATER

The Problem

Many Department of Defense (DOD) installations in semi-arid areas use lagoons for domestic wastewater treatment. The lagoons often discharge effluent to the semi-desert area, and then the effluent water evaporates or percolates into desert sand to the groundwater. Some State regulatory agencies in these areas require DOD Installations to improve the efficiency of wastewater treatment facilities. The Utah Test and Training Range (UTTR), Hill Airbase, UT, and Sierra Army Depot (SIAD), CA, sought technical assistance to screen options that could satisfy those States' requirements and to design the best alternative in terms of life-cycle costs and technical reliability. A consultant had provided Hill Airbase with a design for a lined lagoon for complete evaporation. However, since water is an expensive commodity in arid regions, the reuse of water needed to be considered for the cost benefits in addition to other regulatory considerations.

The Technology

The U.S. Army Construction Engineering Research Laboratory (CERL) recommended that UTTR and SIAD install constructed wetland systems to polish the lagoon effluent and store treated water for a wild life habitat. The use of wetlands for wastewater treatment has increased dramatically since the early 1980s. These applications are used to treat municipal, domestic, industrial, and commercial wastewater, landfill leachates, agricultural wastes, storm runoff, mine drainage, and combined sewer overflows. Wetlands are desirable for these purposes since they are typically inexpensive to build, easy to operate, and capable of very effective treatment. Although wetland technology is not a new concept, DOD installations have rarely used constructed wetland systems.

The two basic types of constructed wetlands are the free water surface wetland and the subsurface flow wetland. The free surface water system is preferred for the semi-arid DOD installations because its construction cost is lower than that of a subsurface system and because, with this system, the water's surface is left exposed and accessible to wild birds and animals. Since DOD wastewater systems remove biological oxygen demand (BOD) in aerated or facultative lagoons, the constructed wetland system serves as a polishing step. At UTTR, after effluent passes through the wetland system, a water storage basin will hold water to a predetermined level to support wildlife. An impermeable liner (or bentonite) will be applied to the basin's bottom to the required elevation, and water will percolate to the ground above the impermeable level.

Benefits/Savings

UTTR has built a constructed wetland system based on CERL's design. The constructed wetland system will require a minimum capital investment compared to the alternative construction of an evaporation lagoon. It will also have lower operation and maintenance costs. The constructed wetland system will produce a treated water quality that fully and reliably complies with environmental regulations. In addition, UTTR will have a small oasis to support habitat for wildlife.

Status

Following the successful technology transfer of the constructed wetland technology concept to UTTR, CERL is developing a similar design concept for SIAD. Detailed design information and cost data are available in CERL Technical Report 97/34, *Development of Constructed Wetlands for the Reuse of Wastewater in Semi-Arid Regions- Case Study at Utah Test and Training Range*, January 1997.

Point of Contact

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